

BASF Aktiengesellschaft

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We claim:

1. A structured catalyst bed which comprises at least the following part beds:
 - (II) at least one catalytically active part bed comprising at least silver, an alkali metal and a porous support material, and
 - (III) at least one catalytically active part bed comprising at least one alkali metal phosphate and at least one sheet silicate.
2. A structured catalyst bed as claimed in claim 1 which further comprises the following part bed:
 - (I) at least one catalytically active part bed comprising at least a mixture of oxides of the main group metals and transition metals.
3. A structured catalyst bed as claimed in claim 1 or 2, wherein the part beds are installed in the order part bed (III) after part bed (II) or part bed (III) after part bed (II) after part bed (I) in the flow direction of the feed gas.
4. A structured catalyst bed as claimed in any of the preceding claims which comprises a not necessarily catalytically active intermediate bed or a gas-free intermediate space which is present in at least one position within the structured catalyst bed, with this position being selected from the following group: (i) before the first catalytically active part bed in the direction of the feed gas flow, (ii) between at least one pair of catalytically active part beds and (iii) after the last catalytically active part bed in the direction of the feed gas flow.
5. A structured catalyst bed as claimed in any of the preceding claims, wherein the catalytically active part beds (I), (II) and (III) and optionally at least one not necessarily catalytically active intermediate bed are installed in any permutation and repetition or in any permutation or repetition.
6. A structured catalyst bed as claimed in any of the preceding claims, wherein the catalytically active part bed (II) comprises Ag together with an alkali metal on α -aluminum oxide.

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7. A structured catalyst bed as claimed in any of the preceding claims, wherein the catalytically active part bed (III) comprises at least one alkali metal phosphate and at least one sheet silicate.
8. A structured catalyst bed as claimed in any of the preceding claims, wherein the catalytically active part bed (I) comprises at least one mixture of at least two oxides of the main group metals and transition metals.
9. A process for preparing crotonaldehyde from C₄-monoolefins or -diolefins in steady-state operation using the structured catalyst bed as claimed in any of the preceding claims.
10. A process as claimed in claim 9, wherein butadiene is used in the feed stream and the following two reactions are catalyzed by the part beds (II) and (III), respectively:
 - (2) epoxidation of butadiene to vinyloxirane;
 - (3) isomerization of vinyloxirane to crotonaldehyde.
11. A process as claimed in claim 10, wherein butene is used in the feed stream and, in addition to the reactions specified in claim 16, the following reaction is catalyzed by the part bed (I):
 - (1) dehydrogenation of butene to butadiene.